

METHOD OF OPERATING OBJECT-ORIENTED DATA STORAGE DEVICE AND METHOD OF OPERATING SYSTEM INCLUDING THE SAME

CROSS-REFERENCE TO RELATED APPLICATION

[0001] This application claims priority from Korean Patent Application No. 10-2015-0105583 filed on Jul. 27, 2015, in the Korean Intellectual Property Office, the disclosure of which is hereby incorporated by reference in its entirety.

BACKGROUND

[0002] Devices and methods consistent with exemplary embodiments relate to a data storage device, more particularly, to a data storage device for accessing an instance in an object-oriented programming language and translating the instance into object data and vice versa, and to a data processing system including the same.

[0003] For using data stored in a memory device, an application program transforms the data into a format readable by the application program while reading the data from the memory device. Such a reprocessing operation may be performed in the main memory of a computer system. When a speed of a central processing unit (CPU) in a host executing the application program is fast enough to accommodate the data bandwidth processed by the memory device, the reprocessing of the application program for the transforming (i.e., the reprocessing by the CPU) is not influenced by the operating speed of the memory device.

[0004] However, when the inputted data bandwidth is larger than the processing speed of a CPU in a host can accommodate, the reprocessing speed of the CPU become a bottleneck in communicating between the CPU and the memory device resulting in the performance degradation of the system.

SUMMARY

[0005] One or more exemplary embodiments provide a method of storing an instance in an object-oriented programming language in a memory device embedded in a data storage device or performing translating the instance into object data in the data storage device and vice versa in order to reduce or disperse a calculation load occurring during a process of writing data to the memory device and reading data from the memory device in a computer system, data storage device, and a data processing system including the data storage device.

[0006] According to an aspect of an exemplary embodiment, there is provided a method of operating a data storage device which is connected with a host and includes a memory device and a controller. The method may include receiving, by the controller, a first instance in object-oriented programming language in response to write command from the host, transforming, by the controller, the first instance into first object data, and programming, by the controller, the first object data into the memory device.

[0007] The method may further include reading the first object data from the memory device in response to a read command from the host, transforming the first object data into the first instance, and transmitting the first instance to the host.

[0008] The data storage device may be a solid state drive (SSD) and the memory device may be identified by one of channels and one of ways.

[0009] The controller may include two central processing units (CPUs). The first central processing unit (CPU) may be related to communication with the host and the second CPU may be related to control of the memory device such as transforming the first instance into the first object data and transforming the first object data into the first instance. The second CPU may include an application programming interface (API) to perform the transforming. The first CPU and the second CPU may share a semiconductor substrate with each other or may be formed in different chips respectively.

[0010] The data storage device may further include dynamic random access memory (DRAM) connected to the controller. The controller and the DRAM may be packaged in a single package. Additionally, the controller, the DRAM, and the memory device may be packaged in a single package. The object-oriented programming language may be Java programming language.

[0011] According to an aspect of another exemplary embodiment, there is a method of operating a data processing system which includes a host and a data storage device. The method includes receiving a first instance in object-oriented programming language in response to a write command from the host by a controller embedded in the data storage device, transforming the first instance into first object data, and programming, the first object data to a memory device embedded in the data storage device.

[0012] The method may further include reading, by the controller, the first object data from the memory device in response to a read command from the host; transforming the first object data into the first instance; and transmitting the first instance to the host. The data storage device may be a direct attached storage (DAS), a data storage for a storage area network (SAN), or a network attached storage (NAS).

[0013] According to an aspect of another exemplary embodiment, there is provided a method of operating a data processing system which includes a host and a data storage device. The method includes transmitting, by the host, an instance in object-oriented programming language to the data storage device during a write operation, and programming, by the data storage device, the instance to a second memory device embedded in the data storage device during the write operation.

[0014] The method may further include reading, by the data storage device, the instance from the second memory device in response to a read command from the host during a read operation; and transmitting, by the data storage device, the instance to the host.

[0015] The method may further include, before the write operation, transmitting, by the host, a read command to the data storage device; transmitting, by the data storage device, object data that has been stored in the second memory device to the host in response to the read command; and transforming, by the host, the object data into the instance and storing the instance in the first memory device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The above and/or other aspects of exemplary embodiments will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings in which: